GT75TT120B3H

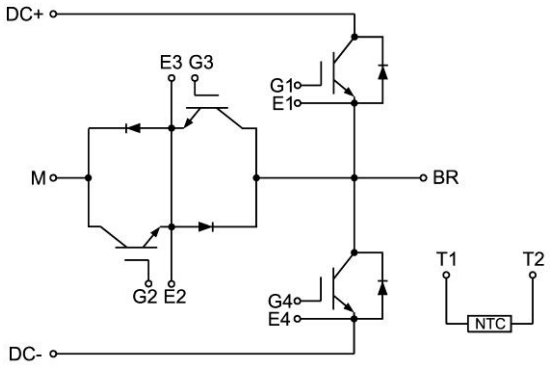
IGBT Module

Preliminary Data

Features：

- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2×Ic)
- Low Stray Inductance
- Mixed Voltage Component Topology
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications：

- 3-Level-Applications
- Solar Applications

IGBT, Buck Switch

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	75	A
		T_C=25℃	150	A
I_{CM}	Repetitive Peak Collector Current	t_P=1ms	150	A
P_D	Maximum Power Dissipation per leg	T_C=25℃ T_{Jmax}=175℃	641	W

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Electrical Characteristics of IGBT (T_C=25℃ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=2.4mA, V_{CE}=V_{GE}		5.0	5.7	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=75A, V_{GE}=15V	T_J=25℃		1.70	2.10	V
			T_J=125℃		2.10		V
			T_J=150℃		2.20		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=±20V, V_{CE}=0V, T_J=25℃				±200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=100kHz			7.97		nF
C_{oes}	Output Capacitance				1.22		nF
C_{res}	Reverse Transfer Capacitance				0.54		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=75A, R_{Gon}=2Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		128		ns
			T_J=125℃		170		
			T_J=150℃		174		
t_r	Rise Time		T_J=25℃		30		ns
			T_J=125℃		36		
			T_J=150℃		36		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=75A, R_{Goff}=2Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		256		ns
			T_J=125℃		376		
			T_J=150℃		384		
t_f	Fall Time		T_J=25℃		158		ns
			T_J=125℃		244		
			T_J=150℃		256		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=75A, R_{Gon}=2Ω, V_{GE}=±15V, di/dt=1801A/μs(T_J=150℃), Inductive Load	T_J=25℃		2.40		mJ
			T_J=125℃		4.38		
			T_J=150℃		4.77		

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E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=75A, R_{Goff}=2Ω, V_{GE}=±15V, du/dt=4370V/μs(T_J=150℃), Inductive Load	T_J=25℃		5.29		mJ
			T_J=125℃		8.27		
			T_J=150℃		8.70		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		2907		nC
$R_{G(int)}$	Internal Gate Resistor		T_J=25℃		6.7		Ω
I_{SC}	V_{CC}=600V, V_{GE}=+/-15V, tp=10us, R_{Gon}=47Ω, R_{Goff}=47Ω, T_J=150℃				319		A
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per IGBT)					0.23	℃/W

Buck Diode

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	650	V
I_F	Diode Continuous Forward Current	T_C=100℃	75	A
I_{FM}	Diode Maximum Forward Current	t_P=1ms	150	A

Electrical Characteristics of Diode (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F=75A	T_J=25℃		1.60		V
			T_J=125℃		1.65		
			T_J=150℃		1.60		
t_{rr}	Reverse Recovery Time	I_F=75A, -diF/dt=1740A/μs(T_J=150℃), V_{rr}=300V, V_{GE}=-15V	T_J=25℃		97		ns
			T_J=125℃		150		
			T_J=150℃		168		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		37.5		A
			T_J=125℃		47.0		
			T_J=150℃		50.5		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		2.40		μC
			T_J=125℃		4.30		
			T_J=150℃		5.00		

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E_{rec}	Reverse Recovery Energy	I_F=75A, -diF/dt=1740A/μs(T_J=150℃), V_{rr}=300V, V_{GE}=-15V	T_J=25℃		0.39		mJ
			T_J=125℃		0.95		
			T_J=150℃		1.17		
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per Diode)					0.37	℃/W

IGBT, Boost Switch

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	75	A
		T_C=25℃	150	A
I_{CM}	Repetitive Peak Collector Current	t_P=1ms	150	A
P_D	Maximum Power Dissipation per leg	T_C=25℃ T_{Jmax}=175℃	288	W

Electrical Characteristics of IGBT (T_C=25℃ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1mA, V_{CE}=V_{GE}		5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=75A, V_{GE}=15V	T_J=25℃		1.95	2.20	V
			T_J=125℃		2.45		V
			T_J=150℃		2.55		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=±20V, V_{CE}=0V, T_J=25℃				±200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz			5.50		nF
C_{oes}	Output Capacitance				0.35		nF
C_{res}	Reverse Transfer Capacitance				0.14		nF

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Switching Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=300V, I_C=75A, R_{Gon}=2Ω, V_{GE}= ±15V, Inductive Load	T_J=25℃		86		ns
			T_J=125℃		92		
			T_J=150℃		92		
t_r	Rise Time		T_J=25℃		54		ns
			T_J=125℃		58		
			T_J=150℃		60		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=300V, I_C=75A, R_{Goff}=2Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		95		ns
			T_J=125℃		97		
			T_J=150℃		98		
t_f	Fall Time		T_J=25℃		84		ns
			T_J=125℃		123		
			T_J=150℃		127		
E_{on}	Turn-on Switching Loss	V_{CC}=300V, I_C=75A, R_{Gon}=2Ω, V_{GE}=±15V, di/dt=1100A/μs(T_J=150℃), Inductive Load	T_J=25℃		0.30		mJ
			T_J=125℃		0.52		
			T_J=150℃		0.58		
E_{off}	Turn-off Switching Loss	V_{CC}=300V, I_C=75A, R_{Goff}=2Ω, V_{GE}=±15V, du/dt=7038V/μs(T_J=150℃), Inductive Load	T_J=25℃		0.78		mJ
			T_J=125℃		1.28		
			T_J=150℃		1.35		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		252		nC
$R_{G(int)}$	Internal Gate Resistor		T_J=25℃		2		Ω
I_{SC}	Vcc=300V, tp=10us, V_{GE}=+/-15V, R_{Gon}=2Ω, R_{Goff}=2Ω, T_J=125℃				506		A
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per IGBT)					0.52	℃/W

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Boost Diode

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current	T_C=100℃	75	A
I_{FM}	Diode Maximum Forward Current	t_P=1ms	150	A

Electrical Characteristics of Diode (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F=75A	T_J=25℃		1.75		V
			T_J=125℃		1.85		
			T_J=150℃		1.80		
t_{rr}	Reverse Recovery Time	I_F=75A, -diF/dt=1847A/μs(T_J=150℃), V_R=600V, V_{GE}=-15V	T_J=25℃		122		ns
			T_J=125℃		178		
			T_J=150℃		186		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		99		A
			T_J=125℃		140		
			T_J=150℃		143		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		6.6		μC
			T_J=125℃		13.5		
			T_J=150℃		14.5		
E_{rec}	Reverse Recovery Energy		T_J=25℃		2.85		mJ
			T_J=125℃		5.73		
			T_J=150℃		6.22		
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per Diode)					0.34	℃/W

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NTC Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R_{25}	T_C=25℃		5		kΩ
△ R/R	T_C=100℃, R_{100}=465Ω	-5		5	%
P_{25}	T_C=25℃			10	mW
$B_{25/50}$	$R_2=R_{25}\ \exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
$B_{25/80}$	$R_2=R_{25}\ \exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
$B_{25/100}$	$R_2=R_{25}\ \exp[B_{25/100}(1/T_2-1/(298.15K))]$		3545		K

Module

Symbol	Description		Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	AC, 30s	4500			V
T_J	Maximum Junction Temperature				175	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+150	℃
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.08	℃/W
T	Mounting Screw:M4		1.0		1.2	N·m
G	Weight			25		g

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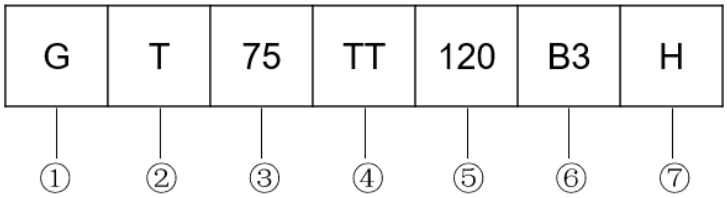
Ordering Information Table

Device code



① - IGBT Module
② - Trench, Low Switching Losses IGBT
③ - Rated Current (75=75A)
④ - Circuit Configuration (Three Level, T Type)
⑤ - Rated Voltage (120=1200V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

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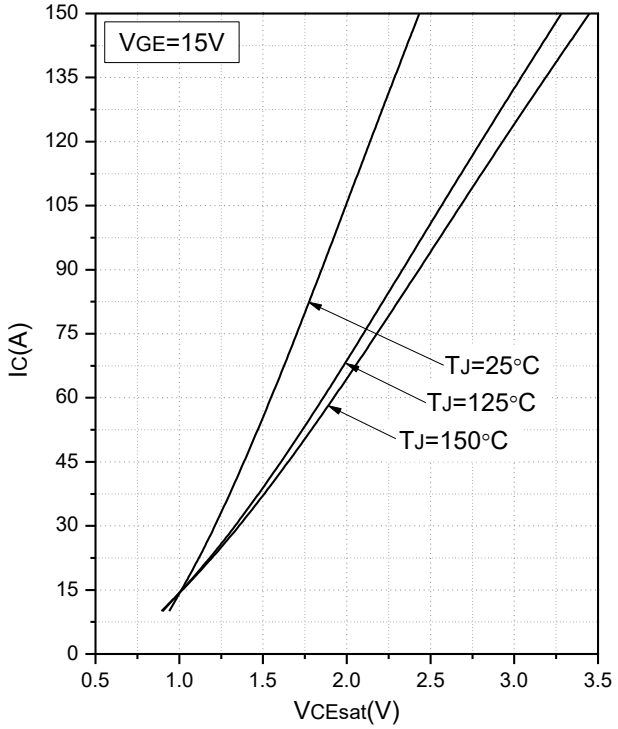

Fig.1 Typical Saturation Voltage Characteristics
(Buck IGBT)

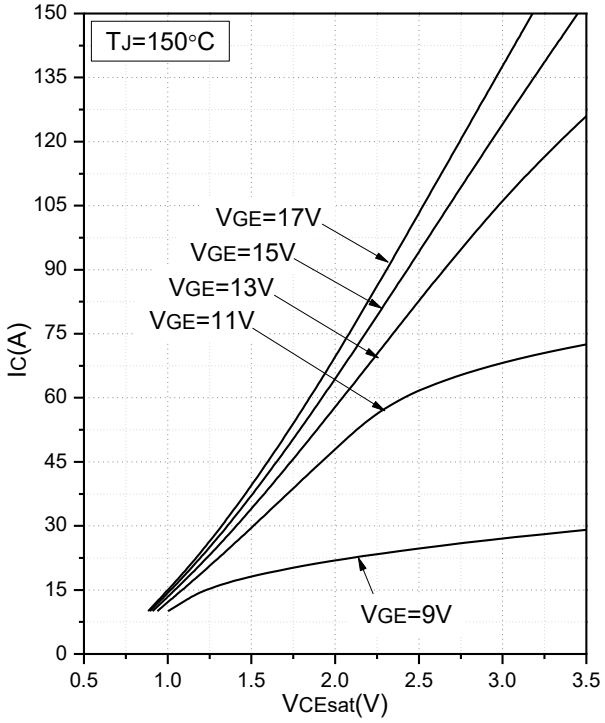

Fig.2 Typical Output Characteristics
(Buck IGBT)

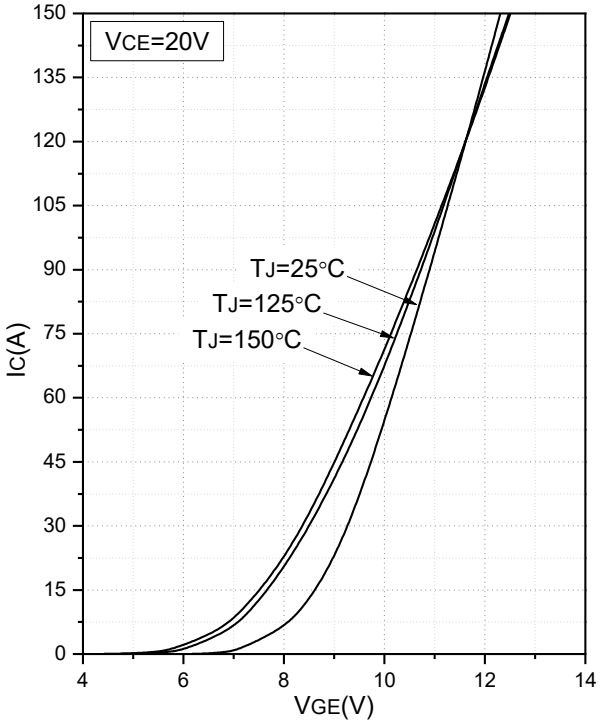

Fig.3 Transfer Characteristics
(Buck IGBT)

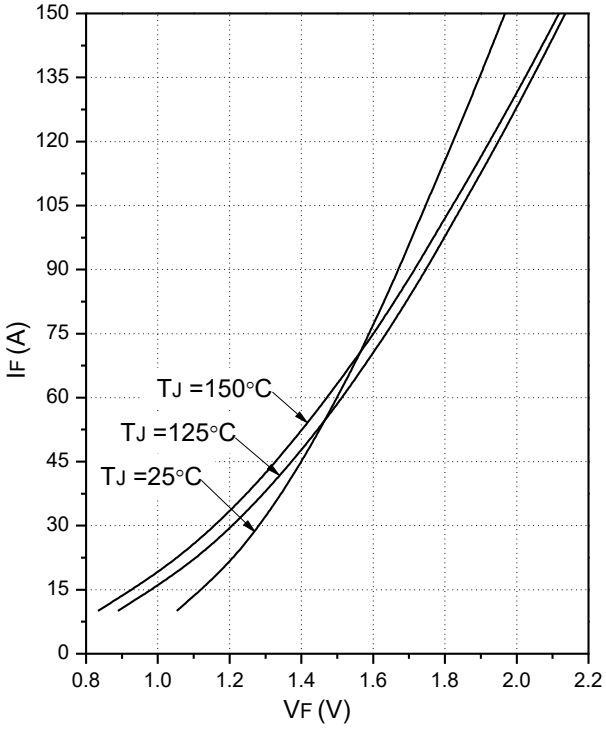

Fig.4 Forward Characteristics of Diode
(Buck Diode)

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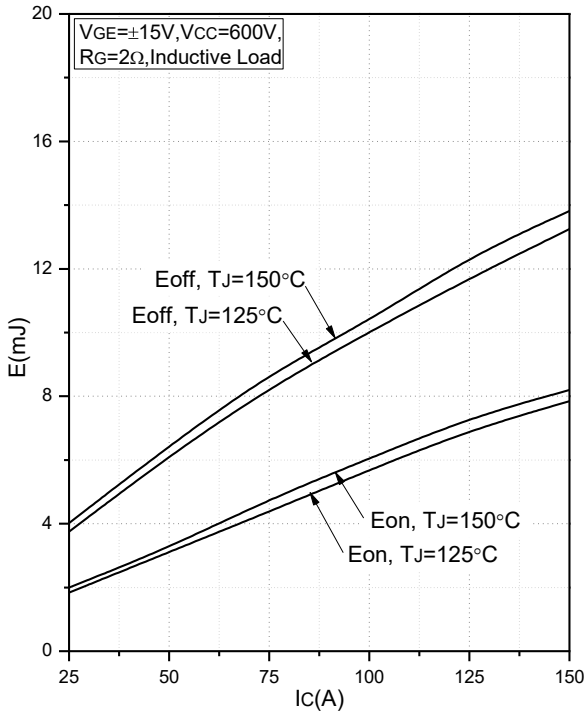

Fig.5 Typical Switching Loss vs. Collector Current (Buck IGBT)

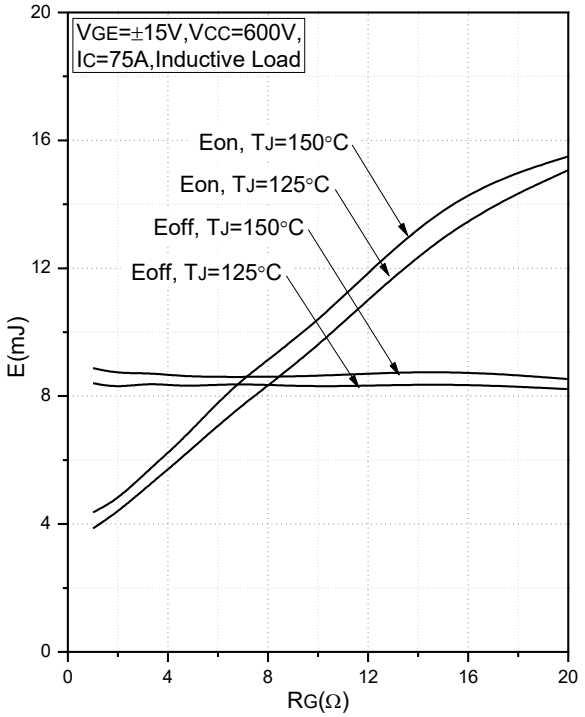

Fig.6 Typical Switching Loss vs. Gate Resistance (Buck IGBT)

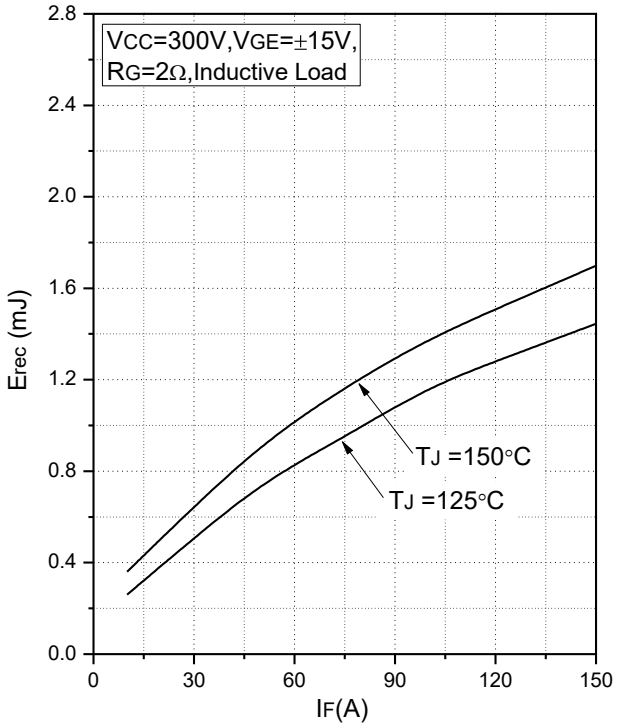

Fig.7 Typical Switching Loss vs. Forward Current (Buck Diode)

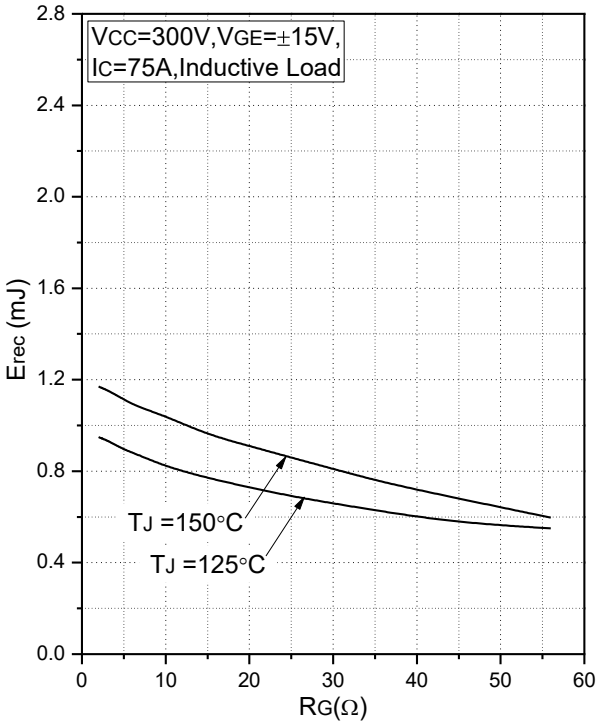

Fig.8 Typical Switching Loss vs. Gate Resistance (Buck Diode)

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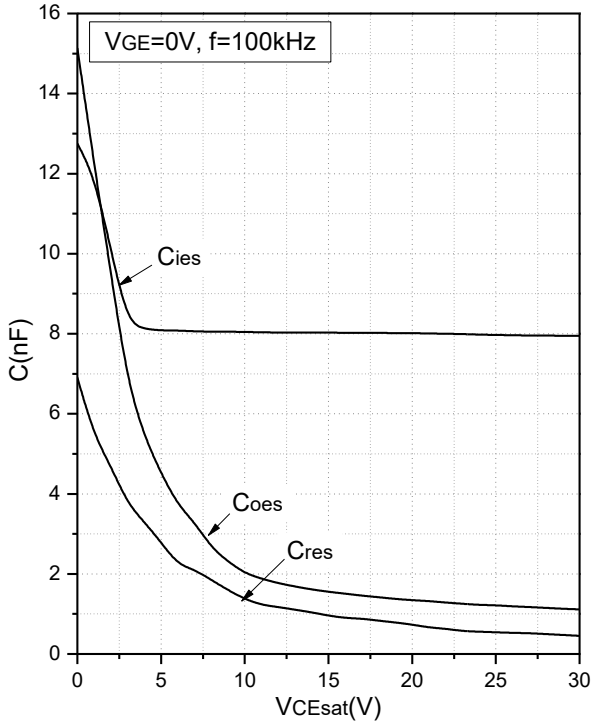

Fig.9 Capacitance Characteristics
(Buck IGBT)

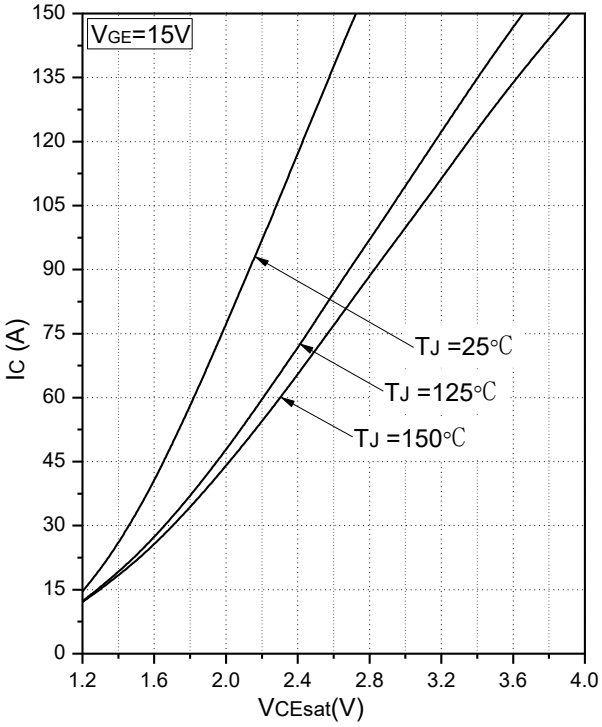

Fig.10 Typical Saturation Voltage Characteristics
(Boost IGBT)

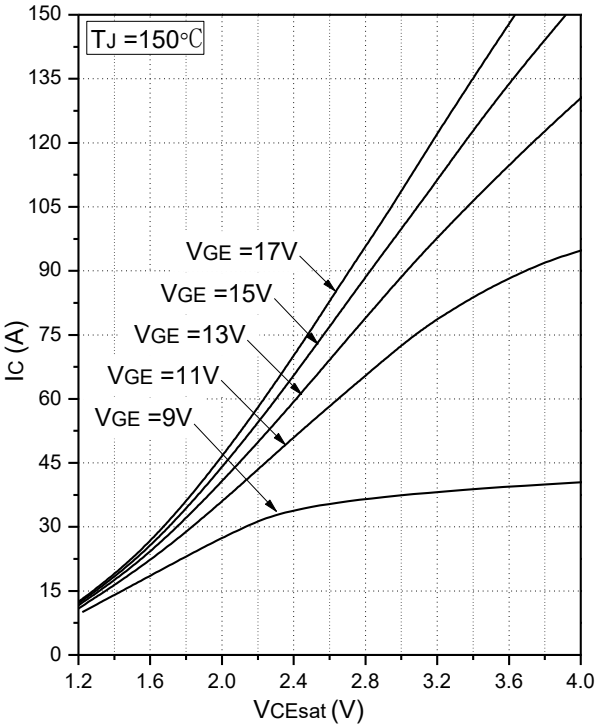

Fig.11 Typical Output Characteristics
(Boost IGBT)

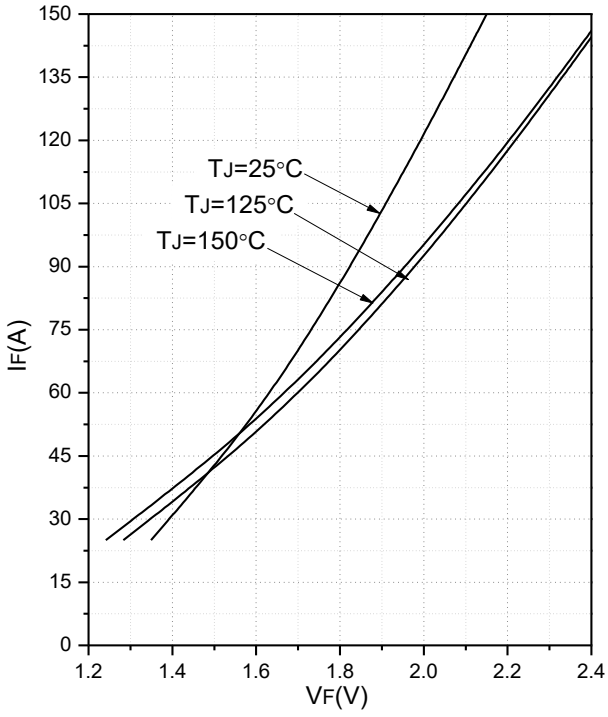

Fig.12 Forward Characteristics of Diode
(Boost Diode)

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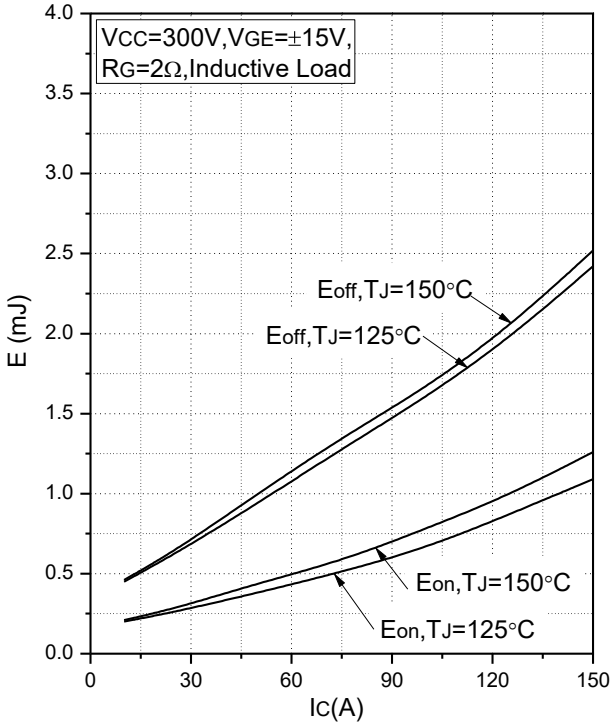

Fig.13 Typical Switching Loss vs. Collector Current (Boost IGBT)

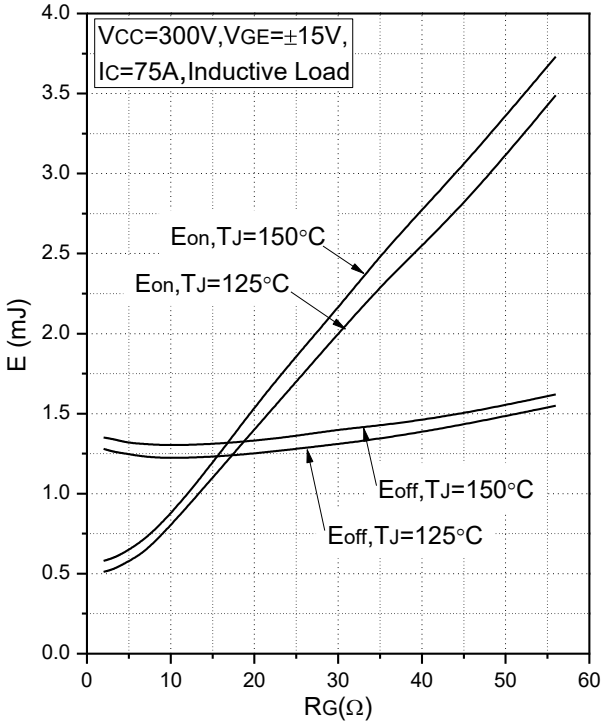

Fig.14 Typical Switching Loss vs. Gate Resistance (Boost IGBT)

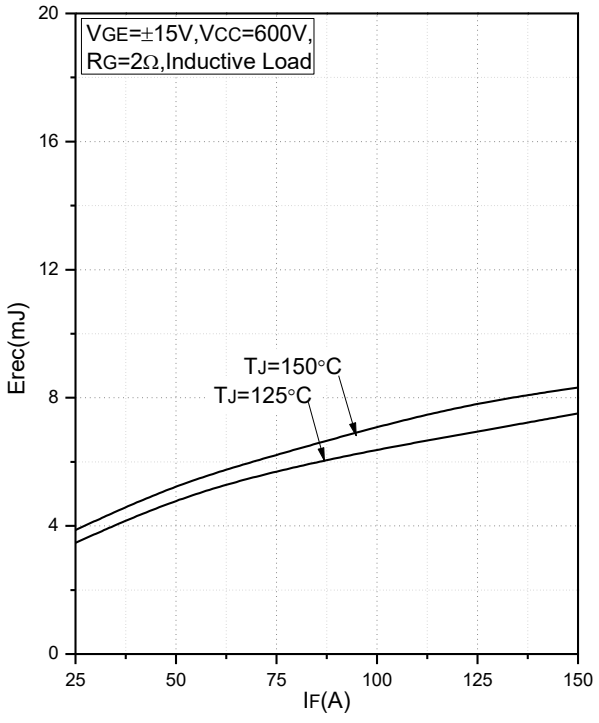

Fig.15 Typical Switching Loss vs. Forward Current (Boost Diode)

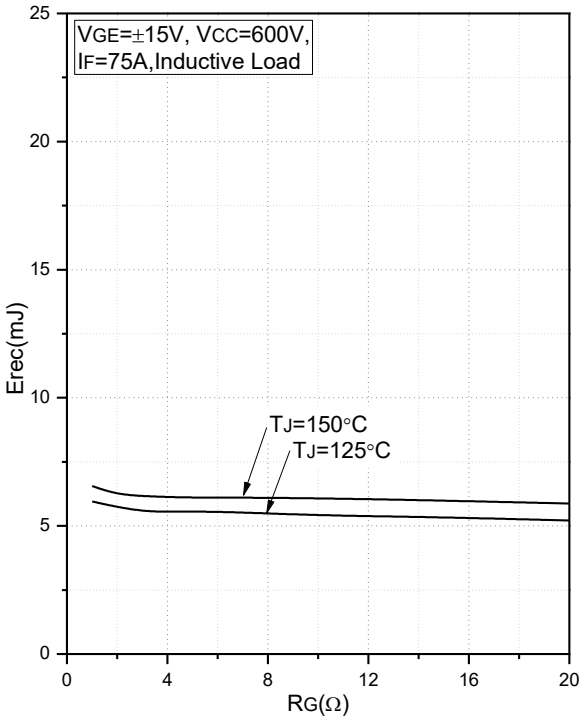

Fig.16 Typical Switching Loss vs. Gate Resistance (Boost Diode)

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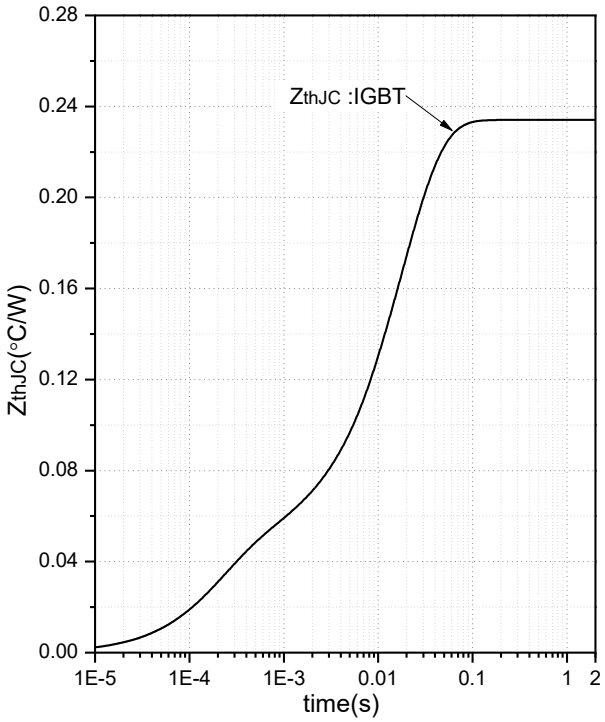

Fig.17 Transient Thermal Impedance
(Buck IGBT)

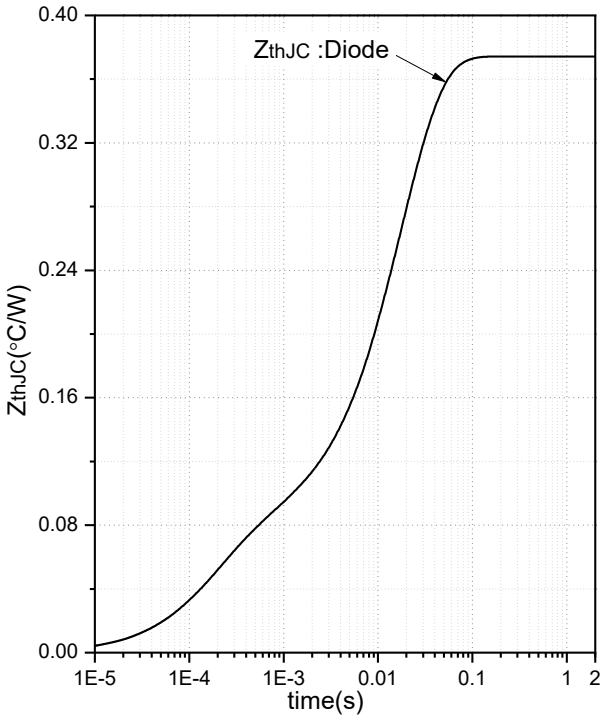

Fig.18 Transient Thermal Impedance
(Buck Diode)

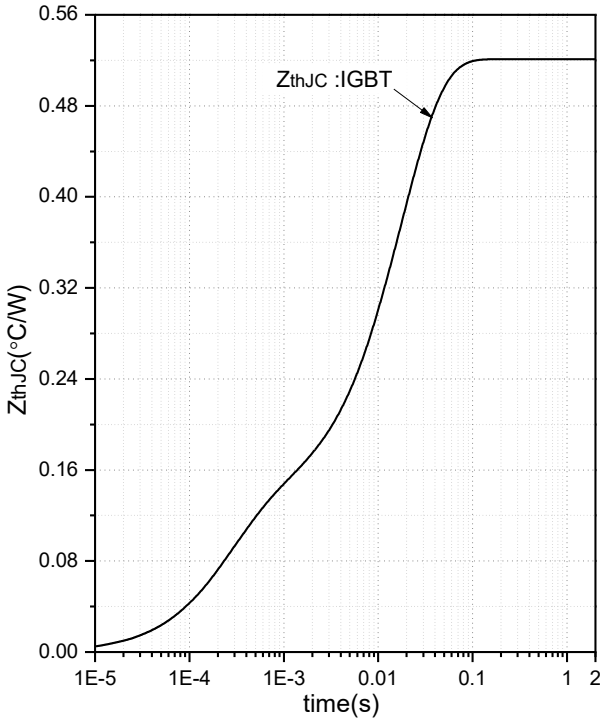

Fig.19 Transient Thermal Impedance
(Boost IGBT)

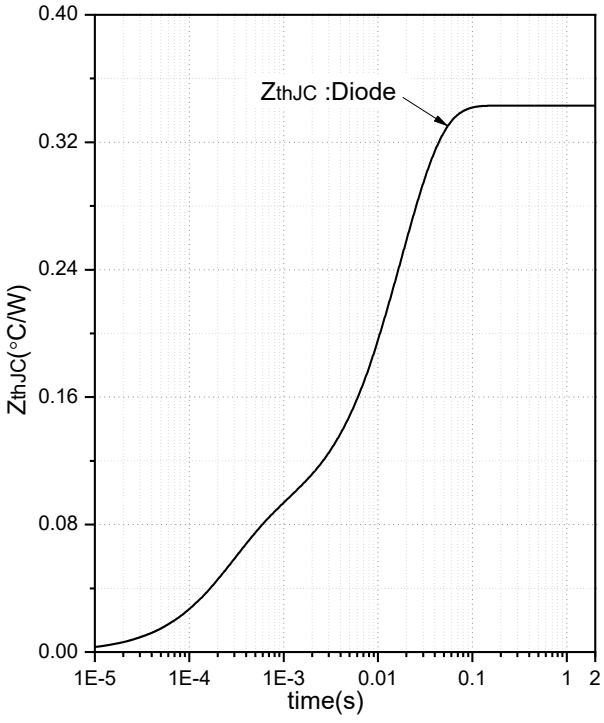

Fig.20 Transient Thermal Impedance
(Boost Diode)

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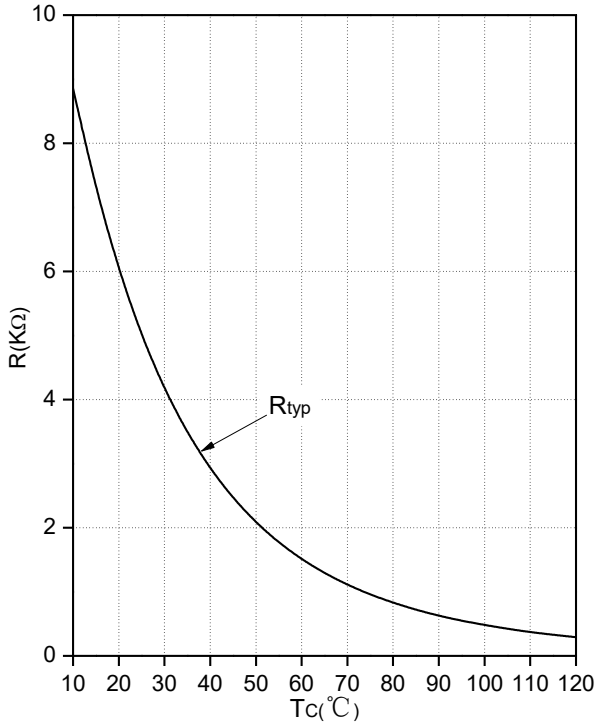

Fig.21 NTC Temperature characteristics

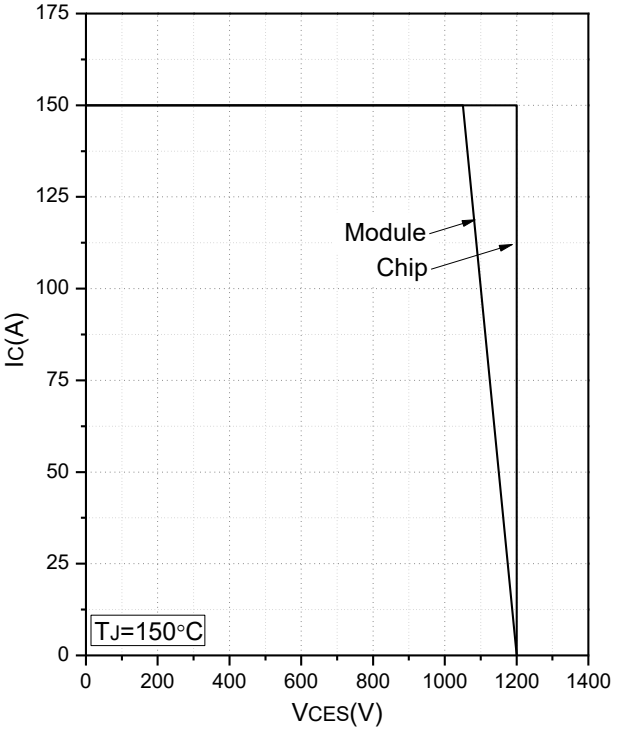

Fig.22 Reverse Bias Safe Operation Area (RBSOA)

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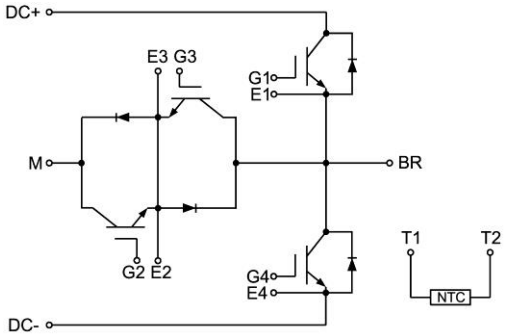
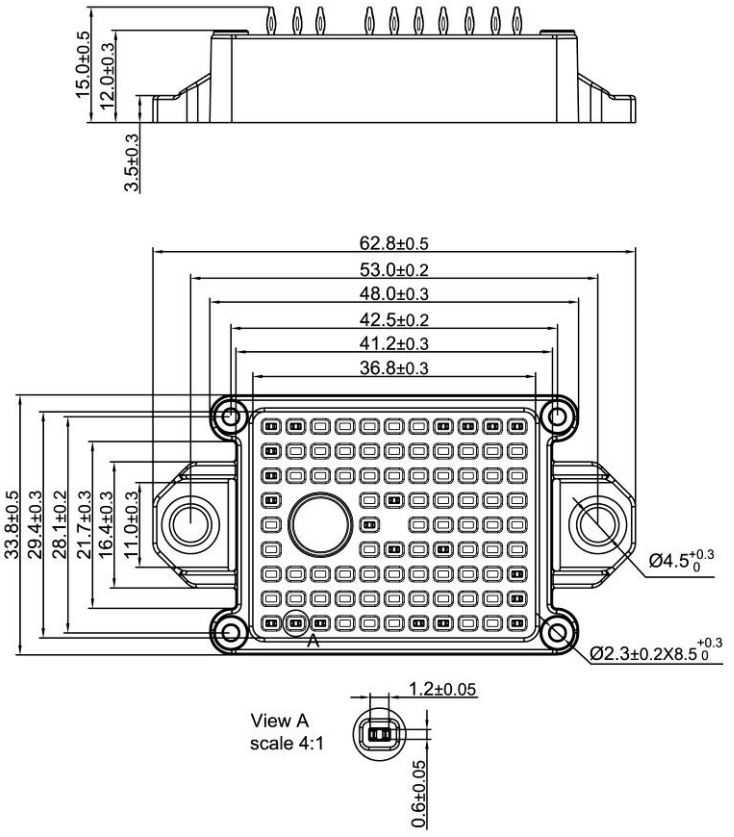
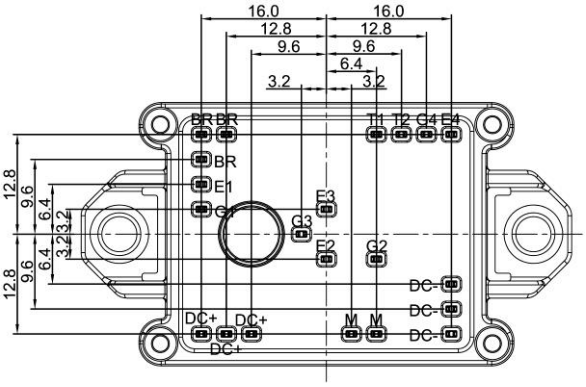
Internal Circuit



Package Outline (Unit: mm):





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Revision	Notes
01	Initial Release

Announcement

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The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

The released datasheet would be issued with “REV.” + “alphabet characters”.

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